

ABSTRACT

A new nonvolatile hybrid memory cell is provided. The cell is comprised of a magnetic spin storage element and one or two semiconductor FET isolation elements. The magnetic spin storage element is an electron spin-based memory element situated on a silicon based substrate and includes a first ferromagnetic layer with a changeable magnetization state, a second ferromagnetic layer with a non-changeable magnetization state, a base layer situated between said first ferromagnetic layer and said second ferromagnetic layer, and a low transmission barrier. The low transmission barrier can be used to adjust a relative base resistance/transimpedance relationship, and thus configure an offset of the device to give a range of outputs ranging from bipolar to unipolar.